

Shame Amid Academic Success: An Interpretative Phenomenological Analysis Case Study of a Student's Experience with Emotions in Engineering

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Abstract

Shame provides a key mechanism of social inclusion and exclusion in engineering contexts. In order to better understand how engineering students experience shame, we used interpretative phenomenological analysis (IPA) to critically examine the individual experience of shame in the case of a high-performing, White woman who was a junior mechanical engineering major at a faith-based university ($n=1$). In particular, we attended to the complex relationship between personal expectations that formed the context for her shame experiences: achieving excellence in performing tasks while maintaining strong social relationships with others. We discuss the implications of this single case study on broader narratives of inclusion in the context of engineering education.

Introduction

I feel like, because I make good grades already, people know that, whether the teacher points it out or not. They kind of know. And so, I feel like that already singles me out and they're thinking, "Oh, you're better than everyone else." They think that I think that I'm better than everyone else because of the grades I make. I don't want to feel that way. I still want to have friends. (Rebecca [pseudonym], junior mechanical engineering student)

The above quote highlights the tension that Rebecca experienced as a mechanical engineering student in performing academically while also remaining socially connected in her relational environment. Informed by psychological literature, we contend that Rebecca gives voice to *shame*, a ubiquitous yet often overlooked phenomenon that is well-integrated in the typical engineering education experience. In particular, this excerpt demonstrates Rebecca's specific experience of shame in the context of being a high-performing, White woman in an engineering domain. She struggled with achieving the felt expectations of performing with excellence ("I make good grades . . . people know that") while also remaining socially connected to others ("I still want to have friends").

We define shame to mean the socio-psychological interaction between cultural expectations and individuals' internal evaluations of how they are meeting these expectations.¹⁻⁶ This definition is informed by literature in psychology and sociology. From a psychological perspective, shame has been conceptualized as an individual's overall devaluation of the self in response to the failure to meet felt expectations.^{1,2} A sociological perspective on shame is oriented to examine sociocultural context that might create the environment for individuals to experience shame in ways that are maladaptive to the social context.^{3,4} Thus, while the present case study is decisively oriented to unpack a single individual's experience of shame, we also recognize that the phenomenon occurs in a broader social frame.

With this in mind, we have chosen to examine Rebecca's case of experiencing shame in the context of being a mechanical engineering student. Rebecca, who identifies as a White woman, was a junior-level mechanical engineering student at the time of our interview with her. She discussed in the interview how she felt that she maintained a good interpersonal relationship with her engineering peers and professors. Additionally, as the epigraph of this paper indicated, Rebecca was a high-performing student and had achieved several markers of traditional success as an engineering student, including high grades and prestigious internships. Furthermore, at the time of the interview, she had planned to pursue a degree in a profession outside of engineering following her graduation. However, as will be clear in our findings, her role as an engineering student was important to understanding her core identity.

We chose to present Rebecca's case of shame as a mechanical engineering student because it highlights a broader narrative regarding the complex socialization processes that women in engineering undergo in their journeys to becoming engineers. Rebecca is confident in her abilities as an engineering student, and her social interactions provide ample validation of this identity. Therefore, on the surface, it may seem unlikely that Rebecca would experience any form of exclusion from an engineering social group. Thus, Rebecca represents a *critical case* for our exploration of shame. According to Flyvbjerg, critical cases "achieve information that permits logical deductions of the type, 'If this is (not) valid for this case, then it applies to all (no) cases'" (p. 230).⁷ Thus, in examining the present forms of shame in Rebecca's case, where we might not expect to find it, we are able to critically examine how shame affects even the most "successful" among engineering students. Moreover, we are able to make explicit the broader social narrative that creates these moments of shame in engineering domains.

Prior Work on Shame in the Context of Education

In order to establish a theoretical foundation for our investigation of Rebecca's experience, we discuss two key bodies of work related to shame in the context of education. Pekrun and colleagues have examined the role of shame in its relationship to academic success through their Achievement Emotions Questionnaire (AEQ).^{8,9} Their work examines shame as one of nine emotions that are interrelated (e.g., pride, anger, boredom) in their connection to academic achievement. Through their control-value theory of these particular emotions, they define shame as a *retrospective outcome emotion*, meaning that it is induced with appraising a past event. And they also categorize it, along with anger and anxiety, as a negative emotion. According to their research, the experience of shame is correlated with a student's likelihood to be externally motivated to avoid failure in their academic performance. However, in experiencing shame, students are also much less likely to be self-regulated in their approach to learning, and their overall academic performance is likely to suffer.^{8,9}

Turner and colleagues have specifically examined the role of *academic shame* in ways that are similarly oriented to Pekrun's body of work. In particular, they have qualitatively and quantitatively examined how students respond to shame experiences in their achieving their academic goals. Building on similar psychological frameworks that also inform the present investigation, they understand shame to be related to a student's perceived failure to meet personal goals.^{10,11} The context of their investigations is especially related to academic performances (e.g., students not receiving their desired grade on an exam), and their findings discuss how students are able to regulate their emotional and cognitive processes in order to achieve learning goals.

Similar to Turner's and Pekrun's research on shame, the present investigation examines this emotional construct in the context of educational settings, specifically within engineering. However, in the present investigation, we are driven to understand the role of shame in the identity processes that undergird an engineering education and examine how this emotional construct affects broader psychological needs (e.g., goal achievement, identity formation, group belonging) of individuals. We contend that shame exists as an underexplored phenomenon that is woven throughout the professional socialization of engineering students. We maintain this belief based on a wealth of engineering education research that has provided detailed findings related to engineering identity formation,¹²⁻¹⁵ belonging,¹⁶⁻²⁰ and stereotype threat.^{21,22} However, while extant literature suggests emotional features of professional formation exist, there is little research that examines the particular patterns of how these emotions are internally experienced and enacted in the context of engineering. By examining existing psychological and sociological research on *shame* as an emotion that is related to feeling disconnected from others,^{3,4,23} we enter the investigation with the inference that this emotional construct is a mechanism that both motivates

exclusionary actions by those who are socially validated as engineers and accompanies the painful experiences of those who are marginalized as engineers.

Research Question and Methodology

Therefore, in order to unpack the role of shame in engineering socialization, we sought to investigate the overarching research question, “How do students psychologically experience shame in the context of engineering education?” This research question defines the larger, ongoing investigation that qualitatively examines the individual and cultural phenomenon of shame, which we have presented elsewhere.^{5,6} Regarding our study of this particular case, we sought to answer the specific question, “How do high-performing, White women experience shame in the context of engineering education?”

We approached this study using interpretative phenomenological analysis (IPA) to carefully examine the contextual and embodied phenomenon of shame. IPA is a qualitative research method that closely examines the personal experience of certain phenomena and articulates contextually sensitive yet theoretically coherent themes.^{24,25} IPA has been used most recently in engineering education research to investigate motivation, emotions, and identity.²⁵⁻²⁹ In the context of the present investigation, using IPA enabled us to both closely examine Rebecca’s lived experience of shame while also connecting these authentic individual constructions to extant psychological theory. This study was approved by Harding University’s IRB (#2017-001).]

Position of authors in relation to study

An IPA study is characterized by a comprehensive process of interpretation that the investigators use to generate knowledge claims. The role of the investigators is to make sense of how individuals are making sense of a particular lived experience. Thus, in this study, we analyzed how Rebecca understood her experience of shame in the context of her role as a mechanical engineering student. However, as investigators, we vary in our closeness to Rebecca’s overall experience as an engineering major and in our experience with using IPA. Thus, we make explicit our respective positions in relation to the study.

Authors Dr. James Huff and Kanembe Shanachilubwa are both affiliated with the faith-based university that Rebecca attended at the time of the interview. James is an assistant professor of engineering education at this university, and Kanembe was in his second year as a mechanical engineering major at the time of the interview and a student in James’s research lab. While James and Kanembe each had met Rebecca before the interview, she was neither enrolled in a course with James nor had she taken a course with Kanembe. The IPA case study was designed for Kanembe to lead efforts related to data analysis, under the close mentoring and supervision of James, who is well-versed in conducting IPA research and mentoring undergraduate and graduate students. As we describe in the following two sub-sections, James and Kanembe carefully worked together in order to maximize the credibility of the research interview while also providing Kanembe with in-depth experience in conducting IPA research.

Author Dr. Stephen Secules is neither affiliated with the faith-based university that Rebecca attended nor does he have any relationship with her. While Stephen is experienced in qualitative research methods, the present study marked his first involvement in an IPA project.

Data collection

We began the study by sending an online sampling questionnaire to all junior mechanical engineering majors at [a certain faith-based university]. The questionnaire requested that respondents provide their self-identified race and gender (open-ended items) and a long-form response to the following questions:

- 1) What types of things do you believe are expected of you as an engineering major?
- 2) Can you describe a time that you felt you did not meet these expectations?

Additionally, they were asked to provide their email address if they consented to the possibility of being interviewed for our project. Rebecca, who identified as a White woman, was one of three individuals who responded to this sampling survey in order to indicate her willingness to participate in the study.

James and Kanembe jointly interviewed Rebecca at a location that was off-campus and outside of regular class hours. James adopted a leading role in conducting the interview while Kanembe asked questions in support of the study's objectives and within the flow of the interview. They had practiced these interviewer roles in an earlier, unrelated study in order to ensure that they coordinated their speaking and presence in a way that made the interview a welcome and empowering space for research participants. Adopting this partnered approach allowed for them to leverage James's extensive experience with conducting qualitative interviews while also providing Kanembe with critical first-hand experience of the interview that he would later spend months analyzing.

In the interview, James adopted an unstructured approach to determining the participant's overall experience of shame in engineering. While not prescribed by a protocol, he elicited data related to Rebecca's overall self-concept, social expectations of what it meant to be an engineer, and the individual responses to these expectations. Both James and Kanembe ensured that the participant guided the interview and focused each of their promptings to enrich descriptions of episodes where she indicated emotions related to shame. Toward the end of the interview, we disclosed the explicit focus of our study and elaborated on how we were defining shame. We then asked Rebecca to comment on the interview based on her understanding of our investigation and to share any new insights. Our interview with Rebecca lasted a total of eighty minutes.

Data analysis

After seven interviews had been conducted by James and Kanembe, these two investigators determined to examine Rebecca's interview transcript as a single case study based on reasons that we identified in the Introduction section of this paper. Although Rebecca's interview was professionally transcribed, Kanembe launched his involvement in the study by completing a second iteration of transcribing the audio file to ensure that the authenticity of the interview event was well-represented in the transcript. In accord with best practices of IPA research, he then completed thorough annotations of the transcript, noting descriptive, linguistic, and conceptual comments throughout.^{25, 30-32} After performing this level of analysis, designed to critically engage him with Rebecca's experiences in shame, he then annotated emerging themes, which captured the connection between Rebecca's contextual experience with broader theoretical models found in psychological literature.²⁴ Kanembe then organized and studied his eighty emerging themes in order to generate overarching themes that were grounded in the complexity and coherence of the participant's experience. This process of data analysis is more thoroughly documented in separate engineering education IPA studies.^{25, 26}

Under the close mentorship of James, Kanembe completed seven passes through the transcript, investing more than 120 hours of analysis for this particular interview transcript. Finally, all of the paper's authors contributed toward interpreting and connecting the findings to extant literature in psychology and engineering education research.

Findings

In order to deconstruct the complex phenomenon of shame that Rebecca experienced, we present our findings in four interconnected themes that are summarized in Table 1. We first describe Rebecca's ambivalent connection between her role as an engineering student and her core identity. Then, we move to describe how achieving excellence in multiple domains of her life formed important personal expectations that guided Rebecca through her engineering degree. Third, we examine the powerful moments of isolation that she experienced in the context of being an engineering major. Finally, we examine how Rebecca sought to cope with her experiences of shame as an engineering student in ways that were both maladaptive and reparative to overcoming the negative emotion.

Table 1: Summary of Themes for Rebecca's Experience of Shame

Theme	Example Quotes
1. "An interesting engineer" – Seeking agency and communion through the engineering major	<p>Lines 678-685: "I feel like the engineering stereotype and the nerd stereotype are kind of similar. I like to learn. I definitely like to learn and I like the math and I like the problem-solving. If somebody calls me a nerd and says I'm an engineer for liking to learn, then absolutely. That is 100% the case."</p> <p>Lines 644-654: "Yes, I want to have friends and I would rather be myself than try to fit another stereotype. A majority of my friends aren't engineers. . . I appreciate that. And um like I said, to me, engineering is not like the be all or end all whatever."</p>
2. Being the best – Expectations informed by social comparisons	<p>Lines 1206-1234: "If I feel like somebody is more [spiritual] than I am then that's gonna bother me and I'm gonna wanna be better um that's gonna challenge me and make me look at myself. . . It doesn't make me think any less of them it just challenges me. . . If I know that I have the ability and I'm not there that means I'm not exerting myself to my potential and that's not okay to me."</p> <p>Lines 450-456: "I feel like smarts don't really have anything to do with it. It's just your time management, your willingness to work hard, your willingness to get your stuff done, not be lazy or give excuses. That sort of thing . . . if you're any student, I feel like those are expected of you. It's a major and so your job is to do your job."</p>
3. Experiencing isolation as a high-performing student	<p>Lines 690-745: "I feel like that's a stereotypical engineer is that, lots of people say, 'Oh, you're smart.' . . . like you saying I'm smart, I feel, is you saying that— is you calling me the stereotype instead of knowing me."</p> <p>Lines 1123-1133: "I feel like you should, because you should be content with whatever you get . . . like a B, if I'm not happy with it then that's to me, that's fine that's not unhealthy . . . but me being competitive and being upset at somebody else for getting a good grade . . . that's not healthy, because that's not the right thing."</p> <p>Lines 187-199: "I tend to make good grades and so teachers will sometimes point that out in class . . . when other people hear it that makes me uncomfortable, too, because I don't want to be singled out and make them feel bad."</p>
4. Hiding and connecting – Responding to the experience of shame	<p>Lines 1087-1094: "I'm high-tailing it out of there because . . . I don't wanna seem mad or (pause) um because I'm very competitive and so a B to me is bad where a B to somebody else might be good and so if I'm upset about a B and somebody else got a B and they're happy with it . . . I'll probably high-tail it out and go do my own thing."</p> <p>Lines 521-526: "Like with [being explicitly called a favorite student by an instructor], instead of just letting that hang there and then everybody thinking about that, I made a joke so that it would kind of dissipate."</p> <p>Lines 482-497: "Sometimes, if I overly stressed . . . my process is to call my mom and complain about it. And then sometimes, she'll try to give me solutions. I'll be like, 'No, mom, I don't need solutions. Just tell me it'll be okay.' She'll be like, 'It'll be okay.' 'Great. You're right...' And then I go back."</p>

Theme 1: "An interesting engineer" – Seeking agency and communion through the engineering major

Rebecca demonstrated a complex relationship between her core concept of a personal identity and her perceived role as a mechanical engineering student. On one hand, she expressed a strong sense of connection to her role as a mechanical engineering student and valued the shared experience that she held

with others in this group. On the other hand, she intentionally and frequently sought distance from the social image of being an engineering major.

At the core of her personal identity, Rebecca prioritized her religious activity as a Christian and achieving high intellectual performances in the course of her education. As she put it, “I take school to be my number one job because I know that making good grades and doing well will ultimately pay off in the long run.” Thus, the salience of being an engineering major, to Rebecca, was that she could perform well in an environment that she found challenging and enjoyable. As she described:

I like to learn. I definitely like to learn and I like the math and I like the problem-solving.
If somebody calls me a nerd and says I’m an engineer for liking to learn, then absolutely.
That is 100% the case.

With conviction, Rebecca embraced the title of being “an engineer” as this role represented an instance of her belonging to a group in which she perceived a similar love for learning and intellectual performance. In being recognized as an engineer, even with derogatory intent, she found a strong sense communion with others that she perceived to also value high performance in a particularly challenging major. What is striking about this desired form recognition is that Rebecca sought to pursue a professional career in a career outside of engineering following her graduation. Yet, being labeled as an engineer provided Rebecca with an important form of belonging that connected with her core form of personal identity.

However, Rebecca also sought to maintain “a good social life” while achieving high performance. As one who especially valued the expression of her Christian faith, she demonstrated a keen sensitivity to the feelings of others in relation to her high performance. To Rebecca, however, her role as an engineer somewhat threatened her priorities on social relationships. And while she valued the recognition of being an engineer, she also sought distance from this category.

I’m an interesting engineer, I think . . . I don’t think I fit the engineering stereotype very well . . . When I tell people that I’m an engineer, lots of times I’ll get, “Whoa. Good for you,” . . . I think it’s because when they think of engineers . . . they are like, “When I think of an engineer, I think of an introvert who has no life and um is quiet and nerdy and only does math all day.” They were like, “That’s not you at all.” (laugh) I was like, “No, I like to have friends and I like to do other things besides math.”

The above excerpt, at a first glance, seems to contradict the value that Rebecca earlier expressed regarding intellectual performances. But we found the distance Rebecca sought to achieve from being categorized as an engineer reflected more of a desire for her individual agency rather than any disdain for engineering. This desire for agency was particularly heightened in light of her participation in engineering as a woman. She described how others’ perception of her, in particular as a woman in engineering, invaded her individual sense of control of her choice to exist as an engineering major:

I’m a girl so I think a lot of people [will say], “Good for you.” Sometimes it makes me feel uncomfortable. It shouldn’t be a “good for me.” That’s [engineering’s] just what I chose to do. It should just be like, “Okay, good.” Like just—you know some girls are like, “I’m an education major.” And everyone’s like, “Oh, yeah, that’s a great job.” And then I say, “I’m an engineering major.” And they’re like, “Good for you. You must be smart.” I’m like, “Nope. I don’t think it has anything to do with that.”

Thus, Rebecca’s relationship to her role as a mechanical engineering major was complex. She desired to be recognized as an engineer on her terms. When others recognized in her someone who valued and

thrived at academic performance, engineering provided a social category in which she found belonging. However, Rebecca resisted the attempts of others to project her identity as that of a prototypical engineer. While desiring communion among other engineers, she also sought to be recognized as autonomous in her choice to pursue her academic major.

Theme 2: Being the best – Expectations informed by social comparisons

The identity relationship that Rebecca maintained with her role as an engineering major existed through the way she experienced social expectations more generally. Beyond engineering, Rebecca developed an overall concept of herself as a high performing individual. Achieving excellence, whether in her faith, in theater, or in her coursework, formed an important feature of Rebecca's overall identity. And comparing herself to other individuals' performances helped her to gauge if she was indeed achieving a high performance in a given domain. As she described with regard to her Christian faith:

Being the best Christian is—that's important to me. If I feel like somebody is more . . . more spiritual or godly than I am, then that's gonna bother me and I'm gonna wanna be better. That's gonna challenge me and make me look at myself . . . It doesn't make me think any less of them; it just challenges me. . . If I know that I have the ability and I'm not there, that means I'm not exerting myself to my potential and that's not okay to me.

Social comparison provided a mechanism for Rebecca to regularly monitor the expression of her identity. Throughout the interview, she was clear in discussing how she remained intentionally compassionate to other individuals in this comparative thinking. However, through comparison, she often developed expectations of herself that motivated her to achieve excellence.

Rebecca did, in some circumstances, make allowances for her to *not* be the best. For example, in one instance, she described a situation in which she felt content to be granted second chair for a particular instrument in a concert band. However, her satisfaction was explained by the fact that the individual who was first chair was tutored by a well-known jazz musician—an opportunity that she did not have access to. But in domains where she felt more in control of her abilities, such as engineering coursework, Rebecca sought to achieve the best performance in relation to others.

However, in Rebecca's view, being the "best" reflected a conscientious and unrelenting work ethic rather than an innate intellectual talent. Indeed, she expressed disdain when people attributed her success or accomplishments to raw intelligence:

I feel like smarts don't really have anything to do with it. It's just your time management, your willingness to work hard, your willingness to get your stuff done, not be lazy or give excuses. . . You know if you're any student, I feel like those are expected of you. It's a major, and so your job is to do your job.

Thus, Rebecca's overall expectations for herself were highly informed by comparison to the performances of other individuals in a similar context. Rebecca was driven to achieve a superlative form of excellence in multiple domains, but her desire to be the best motivated her to achieve a dedicated form of work ethic toward a certain goal. In her experience, this would often result in being socially rewarded through a designation of being the best in a certain domain. Intertwined with Rebecca's sense of identity was a keen attentiveness to how others performed identity in certain contexts. This formed the backdrop of social expectations that she felt she needed to achieve in engineering and other domains.

Theme 3: Experiencing isolation as a high performing student

Rebecca's felt social expectations regarding her consistent achievements of excellence set the stage for the third theme: the experience of isolation brought upon by living as a high performing student. We set the stage for this theme by examining an excerpt that captures Rebecca's ambivalence that she felt in being labeled as "smart."

I mean people call me smart. I feel like smart is a loaded word because different people are very smart in different things. . . There are different ways to be smart, but I enjoy being smart in my way. So I take pride in that and the fact that I make good grades. That's important to me. . . I feel like that's a stereotypical engineer is that, lots of people say, "Oh, you're smart." Smart means different things. I think you should not throw that word around like, "Oh, you must be smart." But I take pride in the smart that I am.

In this excerpt, Rebecca shared that she thrives in her academic achievement. But she also identifies a distinct sense of discomfort that she feels in being labeled as "smart." Through her role as an engineering major, Rebecca described how she experienced times where others would validate her in ways that degraded themselves. For example, in one instance, a member of one of her social organizations complimented her on being smart as an engineering major. Rebecca's discussed her response to this appraisal:

I'm like, "I'm an engineer." And [my peer said], "Oh, well, I'm only an education major. Good for you." That bothers me. My mom's a teacher and she's the smartest person I know. That doesn't make you any less and I don't want to feel—I don't like that.

According to Rebecca, the compliment served to make her feel as if her existence as an engineering major disconnected her from the individual who validated her while diminishing that individual's own value as an education major. Furthermore, Rebecca's social disconnection in this moment was amplified by the feeling that her mother, via her professional role in education, was being degraded in order for her to feel validated. More generally, however, Rebecca's discomfort in being labeled as smart, via her participation in engineering, seemed to be tied to her felt sense of disconnection from others. She discussed her internal reactions to others' appraisals of her after she had received a prestigious internship:

Then some people who . . . don't know me very well would be like, "Ah your internships look awesome. You must be so smart!" That made me feel uncomfortable because, yes, I'm good at what I do and, yes, this internship is a big deal and it means a lot to me . . . but like you saying I'm smart, I feel, is you saying that— is you calling me the stereotype instead of knowing me.

Living with definitive social expectations of achieving excellence while also desiring social connection with other individuals often established powerful moments for Rebecca as an engineering student. While she desired to achieve excellence in ways that were superior, she did not wish for others to feel diminished. More importantly, she did not want to feel responsible for others' feelings of inadequacy by her enacting her role as an engineering student.

While Rebecca felt moments of disconnection from friends who were not engineering majors, she also grappled with finding a social connection among her engineering peers. As stated in the epigraph of this paper, through her high performance as an engineering student, she often managed the feeling of being "singled out" among her classmates. Although she reported how she generally experienced positive

relationships with her mostly male peers in engineering, she described how her experiences of isolation would still occur in subtle yet powerful ways:

I've like noticed that if I'm in—I'll usually get to class earlier than other people because I'm just particular that way so when I show up at class . . . and sit down, the people will only sit beside me if that's the only option at the end.

Rebecca did not fully elaborate on this feeling of disconnection from watching others choose a seat that was distant from her. But as she said elsewhere in the interview, her high performances often caused her to be placed a social spotlight that, rather than validating her identity, gave her poignant moments of social disconnection from her peers. Therefore, Rebecca was seemingly confronted by an impossible paradox that framed her lived experiences as an engineering student: If she continued to enact her core identity as a high-performing student, she would face moments of social disconnection. And yet, if she compromised her performance, she would be living inconsistently from her well-defined self-concept. This paradox of achieving excellence while desiring social connection established an important context for Rebecca to experience shame in her role as an engineering student.

Theme 4: Hiding and connecting – Responding to the experience of shame

In this final theme, we describe the ways that Rebecca processed and experienced shame in the context of her major. We open this discussion by examining a moment in which she had discovered that she received a B on an exam. She described wanting to run and hide from others at the knowledge that she received this score, thinking about what public disclosure could mean for her and for her peers. In this moment, she felt confronted by not achieving excellence while also desiring to not diminish her peers:

I'm high-tailing it out of there because I don't wanna—yeah because I don't wanna seem mad or (pause) um because I'm very competitive and so a B to me is bad—where a B to somebody else might be good. And so, if I'm upset about a B and somebody else got a B and they're happy with it like, I shouldn't bring them like—so I'll probably high-tail it out and go do my own thing.

In this moment, a score on an exam challenged Rebecca's felt expectations of achieving excellence. And the shame of this experience was made complicated by her desire to maintain a social connection with her peers. In this context, she coped by hiding her expression of the pain that she felt, a reaction that kept her isolated from others and also temporarily magnified the social expectations of achieving excellence.

In another incident, Rebecca discussed a different form of shame when a professor let slip in front of the classroom that she was his favorite student. In this moment, though she did not perceive a failure of maintaining her expectations of excellence, Rebecca elaborated on her experience of the event in a way that highlighted her gender and her high performance in the class:

I think I asked a question in class; it wasn't about a problem we were doing. He asked when we wanted to have a test and I said, "Hey, can we not have it Tuesday. Because everyone's busy, like can we have it Thursday?" And he goes, "My favorite—I mean one of my favorites has spoken," . . . And so that made me feel really uncomfortable because then I feel like other people would hold resentment towards me for being the obvious favorite. And I mean there's definitely perks of being a girl. I feel like I'm the department's little sweetheart.

People notice me more because I'm a girl and I'm different . . . Because of that, teachers remember me and I have really good relationships with my teachers, so I do love that

part. . . I've gotten some great recommendations because teachers actually know me, beyond just my work. The work is important. But they know me and my character . . . But just—being singled out like that. Being called the favorite in front of everybody. That made me uncomfortable. . . My go-to is sarcasm and jokes. So I responded with that, “Oh, yeah, the favorite has spoken,” and laughed at myself with everybody. But it's very self-conscious and like, “Oh, I hope people don't not like me because of this.”

In this episode, Rebecca unpacks the shame that she felt as a high-performing woman in engineering. The particular event of being designated as a “favorite” threatened core features of Rebecca's identity by endangering her social connection with her peers and by spotlighting her positive connection to male professors through being a “sweetheart” of the department. And in this moment, Rebecca responded as she did when she received a B on the exam. She hid. But in this occasion, the chosen mechanism for hiding was to employ humor rather than running to remove herself from the situation. We note that in both of these situations, Rebecca's response of hiding left the felt threat to her identity to go unchallenged. Indeed, her perceived social expectations of achieving excellent performance and maintaining social connections were only magnified after these events occurred.

However, in this episode, we also learned that Rebecca developed a different response to processing shame. When she described the above instance of being called the “favorite” student, we asked her to elaborate on why she used sarcasm to cope with the moment. She clarified her response, stating:

I feel like that's what I'm around people that I'm not super super close with. If I'm talking to my mom or talking to my best friend, sometimes I'll just allow myself to cry and then it's out and then I'll be like, “Okay. I've cried and it's fine.”

We note that, in this response to an instance of shame, Rebecca enabled herself to forge connection with someone that she trusted. By expressing the pain through crying, Rebecca provided an occasion that she was transparent with her negative emotions in a way that forged close social connection with trusted individuals. In contrast, by seeking to hide her emotions from her engineering peers, she maintained a state of feeling disconnected from them. The emotional honesty that Rebecca trusted with others provided her a mechanism to maintain stability (“I've cried and it's fine”).

However, we also acknowledge that, in Rebecca's view, her emotional experience represented a gendered phenomenon. As she stated elsewhere in the interview, “I'm still a girl. And this is not a sexist thing, but I have emotions and that happens.” Thus, it is possible that, because of Rebecca's sense of gender identity, she felt that she was able to process emotions in a way that involved opening up to others who she considered trustworthy. Regardless, we do note that, despite her warm feelings toward her engineering peers and professors, she notably sought to not disclose these internal moments of shame in the engineering context. Rather, she sought to hide the pain of her inner world.

Discussion

As we consider Rebecca's experience of shame in the context of her role as an engineering student, we surface to discuss insights that her case provides regarding the engineering student's emotional trajectory of being included in engineering social groups. For although the findings of the present study have focused on a powerful narrative that is embodied in Rebecca's inner world, the four themes lead to generative insights about the culture of engineering degree programs which may be ripe for cultivating moments of shame.

Through the findings, we learn that engineering identity is complex. The study of engineering identity has been an important trend in the literature on engineering marginalization and student experience.^{12,15} Within this work, identity alignment is often discussed as a dimension of students' experiences, and a measure in which students can agree or disagree with on a survey. But the assessment of engineering identity is typically performed with the underlying assumption that achieving a strong identity will lead to positive outcomes within engineering degree programs (e.g., retention) and within engineering students themselves. Certainly, there is good reason to believe that integrating career identity with one's core sense of self leads to positive outcomes in performing this role and in psychological health.^{33, 34}

However, Rebecca's case demonstrates that for students who hold an ambivalent attitude toward their identity as an engineer, it is key to understand the extra pressures they are under as well as the additional mental work and emotional labor that accompany adopting a professional role that goes against others' expectations (e.g., a woman in engineering). If not fitting her own concept of an engineering identity was a source of stress and shame for Rebecca, none of her coping mechanisms, (e.g., cultivating social connections, deflecting with humor) involved trying to convince herself that she does, in fact, identify as an engineer. We may learn from this case that sometimes social connection—rather than identity—is the endpoint that student needs to achieve.

Additionally, while shame is identified as a universal emotion, Rebecca's experience suggests tentative contours of a gendered experience of shame. The findings describe a complex pattern of her desire for excellence in achievement, in ways that are superior to others, while also desiring to hide the isolation and disconnection from peers if her achievements become too public. This fear may represent a level of cautiousness brought on by being already on display (or spotlighted)³⁵ due to gender and by being at a tenuous position regarding acceptance by her male peers. Thus, while the worry that public knowledge of strong academic performance may cause social disconnection likely spans all gendered students, it is reasonable to expect that gender influences the likelihood and character of that fear for Rebecca.

Another plausibly gendered dimension of shame is Rebecca's emphasis on coping through connections with peers. As one of only a few female engineering students, she described consistently seeking solidarity with both female non-engineering peers, her mother, and male engineering peers. She actively resisted taking on the role of a "smart engineer," and this is likely for multiple and gendered reasons. For Rebecca, being a "smart engineer" would be a relatively lonely position, disconnected from her female non-engineering friends and a close female parent. Does being a "smart engineer" mean all of these non-engineers that she cares about are not smart? Perhaps in direct contradiction to what one would expect about positive self-efficacy and identity in engineering, she stands in solidarity with her female non-engineering network as a support mechanism. And yet, Rebecca also enjoys a sense of solidarity with male engineering peers. Here, once again, the label of "smart engineer" would be a dangerous identity to embrace, if smartness and high grades could come at the expense of social connections to these male peers who underperformed Rebecca. One could argue that Rebecca's actual self-efficacy and identity were not at risk as she was internally confident in her intellectual performances as a smart and capable engineer. But in the context of other individuals' expectations of her identity, she grappled with her role. Although some may say that identity is only ever the narrative we tell ourselves about who we are in the world,³⁶ In Rebecca's case, that narrative is not only about herself individually but must also make room for her social support network.

Finally, Rebecca's case invites us to consider the broader narrative about engineering education that formed the backdrop to her phenomenological experience. We note how, only outside of engineering contexts, she employed the reparative, healthy processes of seeking social support (e.g., confiding in her mother or a best friend) and honestly acknowledging her difficult shame emotions. But we also identify

that she processed her emotions with stability through the expectations of performing her perceived gender identity as a woman—not by her career identity as an engineer. Within the engineering context, her expectations of excellence through social comparison enabled her to thrive and be rewarded by professors and peers, which established a readily accessible framework to experience shame. Also, within her engineering domain, she frequently described how she sought to hide her emotional expression, a mechanism that threatened her desired social connection with peers. In this regard, expressing shame seemed to lead to two different forms of penalty. If Rebecca trusted her engineering peers with the honesty of her negative emotions, she might have been isolated from them. And by hiding these moments within her engineering context, she reinforced the felt expectation that it was unsafe to express shame in her this particular domain.

We pause to question the explicit and implicit messages that undergird the culture of engineering education in relation to emotions. Are engineering degree programs and workplaces creating a professional domain that rewards competitive social expectations, where few may actually achieve them? Are engineering domains spaces that do not welcome emotional expression? If so, we contend that—beyond Rebecca’s individual experience—engineering institutional structures are creating environments that create shame for individuals and removes them of the resources that are needed to process the emotion. In contrast, engineering programs have opportunity to achieve positive goals, such as psychological health and inclusivity, by critically examining how they may support the emotional needs of their engineering students and faculty.

How might such programs support the emotional needs of students and faculty? In examining Rebecca’s case, we want to underscore that we do not advocate for attempts to suppress or eradicate the individual experience of shame within engineering programs. Rather, by recognizing shame as a somewhat inevitable phenomenon that occurs in settings of professional socialization, engineering programs can move to create cultures of honestly processing this negative emotion through facilitating social connection. In part, this can be achieved by engineering faculty members clearly stating in their classes that shame is an expected phenomenon to be found in the student experience for engineering majors. By doing so, they can make known to these students that it is safe and realistic to question themselves through events that occur in engineering programs. Furthermore, through this openness, faculty members can implicitly convey that they value students beyond their professional identities and academic performance—creating a space of social support for moments of shame that accompany failure (and success) in relation to others’ expectations.

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